

REMARKS

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Claims 1-4, 12, 15, 16, and 19 are pending in the above application. Claims 5-7 were previously cancelled without prejudice or disclaimer and claims 8-11, 13, 14, 17, 18, and 20 are now canceled without prejudice or disclaimer. Claims 1-4, 12, 15, 16, and 19 are amended without the introduction of any new matter to more accurately describe the invention.

According to the present invention as described in amended claims 1, 15, 16 and 19, there are provided a plurality of nozzles having different lengths through which reaction gas is to be supplied into the reaction container. Each of the plurality of nozzles includes a horizontal portion extending in a horizontal direction and a vertical portion rising in a vertical direction. The horizontal portion is attached to a sidewall of the reaction container such that the horizontal portion penetrates the sidewall of the reaction container. The vertical portion is disposed in the reaction container apart from an inner wall of the reaction container such that a portion of the vertical portion is opposed to the heater. A flow-path cross-sectional area of the portion of the vertical portion that is opposed to at least the heater is greater than a flow-path cross-sectional area of the horizontal portion. A flow-path cross-sectional shape of the portion of the vertical portion that is opposed to at least the heater is formed into a shape in which a width in a direction of a straight line connecting a center of the substrate and a center of the vertical portion with each other is smaller than a width in a direction perpendicular to the straight line direction.

Such structure that the flow-path cross-sectional area of the portion, which is opposed to at least the heater, of the vertical portion is greater than the flow-path cross-sectional area of the horizontal portion with respect to each of the plurality of nozzles having different length suppresses the clogging of the nozzle, and increases the number of processing applications that can be performed until maintenance is required.

In addition to this structure, regarding each of the plurality of nozzles having different lengths, the flow-path cross-sectional shape of the portion of the vertical portion that is opposed to at least the heater is formed into the shape in which the width in the direction of the straight

line connecting the center of the substrate and the center of the vertical portion with each other is smaller than the width in the direction perpendicular to the straight line direction.

Such structure does not require any increase in clearance between the substrate(s) and the reaction container even if the flow-path cross-sectional area of the portion of the vertical portion that is opposed to at least the heater is greater than the flow-path cross-sectional area of the horizontal portion. Therefore, it is possible to use a reaction container having the same shape as that of a conventional reaction container as it is, hence there is no need to change the design of the reaction container.

Contrary to this claimed structure, if a circular shape is employed as the flow-path cross-sectional shape of the portion that is opposed to at least the heater in the vertical portion of each of the plurality of nozzles in the same way as the conventional technology, and the flow-path cross-sectional area of this portion is made greater than the flow-path cross-sectional area of the horizontal portion, it is then necessary to extend the clearance between the substrate(s) and the reaction container in accordance with increase in cross-sectional area of each of the plurality of nozzles. Hence, it then becomes necessary to newly design (change the design of) the reaction container by increasing a diameter of the reaction container, etc.

ACTION SUMMARY

The outstanding Action presents a rejection of claims 2-4 under the second paragraph of 35 U.S.C. § 112, a rejection of claims 1, 3, and 8-15 under 35 U.S.C. § 102(e) as being anticipated by, or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over Okuda et al. (U.S. Published Patent Application No. 2003/0024477, hereinafter "Okuda"), a rejection of claims 1, 3, and 8-11, 13-15 under 35 U.S.C. § 102(e) as being anticipated by, or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over Kontani et al. (U.S. Published Patent Application No. 2004/0025786, hereinafter "Kontani"), a rejection of claims 2, 4, and 16-20 under 35 U.S.C. § 103(a) as being unpatentable over Okuda in view of Noda et al. (JP 2003-045811, hereinafter "Noda"), a rejection of claims 2, 4, and 16-20 under 35 U.S.C. § 103(a) as being unpatentable over Okuda in view of Saito et al. (U.S. Patent No. 6,383,300, hereinafter "Saito"), and a rejection of claims 2, 4, and 16-20 under 35 U.S.C. § 103(a) as being

unpatentable over Okuda in view of Yoshino Akihito (JP 2003-045811, hereinafter “Akihito”).

IMPROPER ACTION FINALITY

Initially, it is noted that MPEP § 706.02 II only permits reliance on references not in English in a non-final Office Action under limited circumstances as follows:

If the document is in a language other than English and the examiner seeks to rely on that document, a translation must be obtained so that the record is clear as to the precise facts the examiner is relying upon in support of the rejection. . . . In limited circumstances, it may be appropriate for the examiner to make a rejection in a non-final Office action based in whole or in part on the abstract only without relying on the full text document. In such circumstances, the full text document and a translation (if not in English) may be supplied in the next Office action. Whether the next Office action may be made final is governed by MPEP § 706.07(a). (Emphasis added).

Clearly, it is improper for the outstanding Office Action to be made final when it presents reliance on Noda, a reference that is not in English, without the MPEP § 706.02 II required translation. Accordingly, as this Office Action cannot be properly made final, the withdrawal of the finality of this Office Action is respectfully requested along with the entry of the present amendments to the claims.

SECOND PARAGRAPH REJECTION OF CLAIMS 2-4

The outstanding Action is mistaken in suggesting that parent independent claim 1 defines “the nozzle cross section” so that the recitations of claims 2-4 that further limit the claim 1 recited “cross-sectional shape” are not consistent therewith. In this regard, amended claim 1 recites “a cross-sectional shape of the at least a part of the second portion of said at least one nozzle including the gas ejecting port opening that is opposed to said heater has a width in a direction of a straight line connecting a center of the plurality of substrates and the central longitudinal axis of the second portion of the at least one nozzle with each other is smaller than a width in a direction perpendicular to the straight line direction.” This recitation is compatible and consistent with the claim 2 recited cross-sectional shape of “a squashy circular shape” and the claim 4 recited cross-sectional shape of a “substantially elliptic shape.” See the disclosure in

the specification at page 24, line 12 to page 25, line 16. This disclosure makes it clear that the numerous examples of shapes include the claim 2 recited “squashy circular shape” and the claim 4 recited cross “substantially elliptic shape.” Note MPEP § 2173.02 that establishes that the claim language is to be interpreted in light of the content of the particular application disclosure and not in a vacuum.

Accordingly, the withdrawal of the rejection of claims 2-4 under the second paragraph of 35 U.S.C. § 112 is respectfully requested.

REJECTION OF CLAIMS 1, 3, AND 8-15 OVER OKUDA

The rejection of claims 8-11, 13 and 14 over Okuda is noted to be moot as these claims have been canceled.

Turning to claims 1, 3, 12, and 15, the outstanding Office Action relies on the showings of FIGS. 1-3 that illustrate the nozzle 21 of Okuda to have a narrower width in the radial direction than the width in a direction perpendicular thereto. However, while Okuda discloses a structure in which a flow path cross sectional area of a portion of the gas nozzle 21 which is opposed to the heater 11 is greater than that of the gas introduction 18, Okuda further requires that DCS is supplied to a plurality of portions in the substrate arranging region through the plurality of gas nozzle openings 24 provided to the gas nozzle 21. Thus, Okuda does not teach or suggest that the reaction gas is supplied to the plurality of portions in the substrate arranging region using a plurality of nozzles having different lengths as these claims require.

In Okuda, DCS is supplied to the plurality of portions in the substrate arranging region through one nozzle with the plurality of openings, and therefore, there is no need to take the trouble to provide a plurality of nozzles having different lengths. Taking the size (width) of the nozzle 21 of Okuda into consideration, it is inconceivable to use a plurality of nozzles to replace the nozzle 21 of Okuda. In this regard, assuming the artisan would even attempt to use a plurality of nozzles having different lengths in place of the nozzle 21 of Okuda, considering the size (width) of the nozzle it is clear that such nozzles themselves become obstacles to each other. Thus, this attempt would not be made as the artisan would realize that it would fail because the obstructing gas nozzles will cause changes of a gas flow and conductance in the

cylinder reaction tube 12 that will hinder uniform processing. In other words, the use of the above-mentioned plurality of nozzles having different lengths according to the present invention would not be considered to be a reasonable alternative to the nozzle 21 of Okuda.

Further, in Okuda, a vertical portion of the gas nozzle 21 is secured altogether to an inner wall of the cylinder reaction tube 12 as a reaction container (that is, the gas nozzle 21 and the cylinder reaction tube 12 are integrated). In Okuda, a plurality of nozzles are not disclosed which have different lengths and each of which includes a horizontal portion extending in a horizontal direction and a vertical portion rising in a vertical direction, the horizontal portion being attached to a sidewall of the reaction container such that the horizontal portion penetrates the sidewall of the reaction container. Further, in Okuda, the vertical portion is not disposed in the reaction container in a manner that the vertical portion is apart from the inner wall of the reaction container.

Even assuming the case in which the nozzle 21 of Okuda is modified to have a horizontal portion extending in a horizontal direction that penetrates and is attached to a sidewall of the reaction container along with a vertical portion rising in a vertical direction from this horizontal portion, with the vertical portion being disposed in the reaction container apart from the inner wall of the reaction container, a considerable amount of stress would be imposed on the horizontal portion due to the weight of the vertical portion. The artisan would surely be aware that this free standing vertical portion of nozzle 21 would result in such a mechanical stress problem as well as possible flexing problems. As a result, the Artisan would clearly have had no expectation of any benefit to be achieved by such a modification to the existing nozzle 21 of Okuda.

Also note that it is well established that a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984) 270 F.2d at 813, 123 USPQ at 352. Here the teachings of Okuda clearly lead away from the claimed invention.

Therefore, as claim 1 includes at least the above-noted subject matter that is not taught or reasonably suggested by Okuda, the withdrawal of the rejection of claim 1 under 35 U.S.C. §

102(e) as being anticipated by, or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over Okuda is respectfully requested.

While claim 15 is a method claim, it requires the use of the above-noted plurality of nozzles having different lengths with vertical that are “disposed in said reaction container apart from an inner wall of said reaction container such that a portion of the vertical portion is opposed to said heater disposed to heat the plurality of the substrates.” Claim 15 also requires “a flow-path cross-sectional area of the a portion of the vertical portion opposed to at least the heater being greater than a flow-path cross-sectional area of the horizontal portion,” and “a flow-path cross-sectional shape of the portion of said vertical portion that is opposed to at least said heater being formed into a shape in which a width of the portion of said vertical portion in a direction of a straight line connecting a center of the substrate and a center of the vertical portion with each other is smaller than a width of the portion of the vertical portion in a direction perpendicular to the straight line direction.” Accordingly, claim 15 is respectfully submitted to patentably define over the reasonable teachings and suggestions of Okuda for at least the same reasons as claim 1. Thus, the withdrawal of the rejection of claim 15 under 35 U.S.C. § 102(e) as being anticipated by, or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over Okuda is also respectfully requested.

As claims 3 and 12 depend from claim 1 they are submitted to be allowable for at least the same reasons as claim 1. In addition, claims 3 and 12 add further features not taught or suggested by Okuda. Thus, the withdrawal of the rejection of claims 3 and 8-14 under 35 U.S.C. § 102(e) as being anticipated by, or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over Okuda is further respectfully requested.

REJECTION OF CLAIMS 1, 3, 8-11 AND 13-15 OVER KONTANI

The rejection of claims 8-11, 13 and 14 over Kontani is noted to be moot as these claims have been canceled.

Furthermore, Kontani is similar to Okuda in that the teachings of Kontani as to the relied upon “nozzle” 17 are contrary to the above-noted subject matter of independent claims 1 and 15.

In this regard, Kontani discloses a structure in which a flow path cross sectional area of a portion of the buffer chamber 17 (corresponding to a nozzle) which is opposed to at least the heater 16 is greater than that of the gas introduction opening 5.

In Kontani, however, gas is supplied to a plurality of portions in the substrate arranging region through buffer chamber holes 3 provided to the buffer chamber 17. Kontani does not disclose that the reaction gas is supplied to the plurality of portions in the substrate arranging region using a plurality of nozzles having different lengths as the present invention of the rejected claims requires.

Also, in Kontani, gas is supplied to the plurality of portions in the substrate arranging region through one nozzle with the plurality of openings, and there is no need to take the trouble to provide a plurality of nozzles having different lengths. Assuming that a plurality of buffer chambers 17 having different lengths were to be used in Kontani, considering the size (width) of the buffer chamber 17, the buffer chambers 17 themselves would again become obstacles which cause changes in a gas flow and conductance in the reaction tube 6, resulting in hindering the above noted uniform processing. In other words, Kontani is like Ojkuda and would not be modified to have such a plurality of obstructing nozzles for the same reasons noted above.

Further, in Kontani, a vertical portion of the buffer chamber 17 is secured altogether to an inner wall of the reaction tube 6 as a reaction container (that is, the buffer chamber 17 and the reaction tube 6 are integrated). In Kontani, a plurality of nozzles are not disclosed which have different lengths and each of which includes a horizontal portion extending in a horizontal direction and a vertical portion rising in a vertical direction, the horizontal portion being attached to a sidewall of the reaction container such that the horizontal portion penetrates the sidewall of the reaction container. Further, in Kontani, the vertical portion is not disposed in the reaction container in a manner that the vertical portion is apart from the inner wall of the reaction container. Again, there would be no reason to provide the buffer chamber 17 of Kontani with the claimed horizontal portion and the claimed vertical portion that must be disposed in the reaction container apart from the inner wall of the reaction, due to the weight of the vertical portion and the mechanical problems that would result as noted above. Consequently, the Artisan would

clearly have had no expectation of any benefit to be achieved by such a modification to the existing nozzle 17 of Kontani.

Therefore, as independent claims 1 and 15 include at least the above-noted subject matter that is not taught or reasonably suggested by Kontani, the withdrawal of the rejection of independent claims 1 and 15 under 35 U.S.C. § 102(e) as being anticipated by, or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over Kontani is respectfully requested.

As claims 3 depends from independent claim 1, it is submitted to be allowable for at least the same reasons as claim 1. In addition, claim 3 adds further features that are also not taught or suggested by Kontani. Thus, the withdrawal of the rejection of claim 3 under 35 U.S.C. § 102(e) as being anticipated by, or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over Kontani is further respectfully requested.

REJECTION OF CLAIMS 2, 4, AND 16-20 OVER OKUDA AND NODA

The rejection of claims 17, 18, and 20 over Okuda and Noda is noted to be moot as claims 17, 18, and 20 have been canceled.

As noted above relative to base independent claim 1 from which claims 2 and 4 depend, Okuda does not teach or suggest the subject matter of this base independent claim. As further noted above, the modification of Okuda to include this subject matter would not be considered to be obvious by the artisan. Noda does not cure the deficiencies in Okuda or supply any reasonable basis for any modification of Okuda.

Independent apparatus claim 16 is also submitted to be allowable over Okuda considered with Noda as it recites the same basic distinguishing features that are in claim 1. Also, it is clear that there would be no reason for the artisan to add a nozzle that does not extend into the heating region as an equivalent to one of the openings 24 provided in the nozzle 21 Okuda. In this regard, Okuda teaches that all of the openings 24 are to provide horizontal gas flow across the surfaces of a wafer “W” and that all the wafers “W” are to be in the heating region. Thus, to the extent that the outstanding Action has apparently interpreted Noda as somehow teaching that one nozzle is to penetrate through an outer wall of the reaction container and into a second region of the reaction container that is not opposed to the heater to supply reaction gas thereto, there is

nothing taught or reasonably suggested by these references pointing to the use of such a nozzle as an equivalent to the Okuda taught the openings 24 that are to provide the required horizontal gas flow across the surfaces of a wafer "W" in the heating region. The PTO suggestion of equivalence is clearly an improper subjective conclusion lacking substantial evidence in the record here. Such conclusions cannot serve as a replacement for actual evidence. *See In re Lee*, 277 F.3d 1338, 1343, 61 USPQ2d 1430, 1433 (Fed. Cir. 2002).

Accordingly, as the required subject matter of claim 16 is also not shown or suggested by the art of record, independent apparatus claim 16 is submitted to be allowable for at least this reason. Therefore, the withdrawal of the rejection of independent apparatus claim 16 under 35 U.S.C. § 103 (a) over Okuda considered with Noda is respectfully requested.

Independent claim 19 is a method claim that parallels the subject matter of independent apparatus claim 16. Accordingly, independent method claim 19 is submitted to be allowable for similar reasons to those noted above as to independent apparatus claim 16. Consequently, the withdrawal of the rejection of independent method claim 19 under 35 U.S.C. § 103 (a) over Okuda considered with Noda is respectfully requested.

REJECTION OF CLAIMS 2, 4, AND 16-20 OVER OKUDA AND SAITO

The rejection of claims 17, 18, and 20 over Okuda and Saito is noted to be moot as claims 17, 18, and 20 have been canceled.

It is noted that Saito does not cure the deficiencies noted above as to the teachings of Okuda considered with Noda. Accordingly, the rejection of claims 2, 4, 16, and 19 under 35 U.S.C. § 103(a) as being unpatentable over Okuda in view of Saito is traversed for the reasons noted above as to the rejection of these claims based on Okuda considered with Noda. Therefore, the withdrawal of the rejection of claims 2, 4, 16, and 19 under 35 U.S.C. § 103(a) as being unpatentable over Okuda in view of Saito is likewise respectfully requested.

REJECTION OF CLAIMS 2, 4, AND 16-20 OVER OKUDA AND AKIHITO

The rejection of claims 17, 18, and 20 over Okuda and Akihito is noted to be moot as claims 17, 18, and 20 have been canceled.

It is noted that Akihito does not cure the deficiencies noted above as to the teachings of Okuda considered with Noda. Accordingly, the rejection of claims 2, 4, 16, and 19 under 35 U.S.C. § 103(a) as being unpatentable over Okuda in view of Akihito is traversed for the reasons noted above as to the rejection of these claims based on Okuda considered with Noda. Therefore, the withdrawal of the rejection of claims 2, 4, 16, and 19 under 35 U.S.C. § 103(a) as being unpatentable over Okuda in view of Akihito is additionally respectfully requested.

With further regard to Noda, Saito, and Akihito, to whatever extent that these references teach an apparatus including a plurality of nozzles having different lengths, this does not change the fact that the artisan would have realized that it was inconceivable to modify the nozzle 21 of Okuda or the nozzle 17 of Kontani based on these teachings as noted above. Therefore, it would not have been obvious for one of ordinary skill in the art to provide a plurality of nozzles in place of nozzle 21 of Okuda or nozzle 17 of Kontani following any reasonable teachings or suggestions in Noda, Saito, and/or Akihito.

CONCLUSION

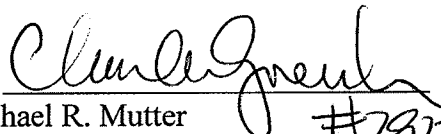
Each issue raised in the Office Action dated March 18, 2008, has been addressed, and it is believed that pending claims 1-4, 12, 15, 16, and 19 are in condition for allowance. Wherefore, reconsideration and allowance of these claims is earnestly solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Raymond F. Cardillo Reg. No. 40,440 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.147; particularly, extension of time fees.

Dated: June 18, 2008

Respectfully submitted,

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